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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/802,681	WATANABE, KAZUYO	
	Examiner	Art Unit	
	David P. Rashid	2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-14 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-14 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 17 March 2004 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 6/16/2004.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

All of the examiner's suggestions presented herein below have been assumed for examination purposes, unless otherwise noted.

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file - Japanese Patent Application No. 2003-071267, filed 3/17/2003.

Drawings

2. The drawings are objected to because of the following:

(i) FIG. 1 contains a grammatical error for reference character S101 – suggest placing a space between "AND" and "3-LARGE-PEAK"

(ii) FIG. 1 is inconsistent with the specification for reference character S103 when citing "DEVIATION > 80" and the specification cites "luminance standard deviation < 80" and their respective inconsistent outcomes – suggest changing either the drawing or specification to be consistent with each other.

(iii) FIG. 1 is inconsistent with the specification for reference character S104 when citing "AVERAGE VALUE < 160" and the specification cites "luminance average value > 160" and their respective inconsistent outcomes – suggest changing either the drawing or specification to be consistent with each other.

(iv) FIG. 1 is inconsistent with the specification for reference character S105 when citing "DEVIATION > 80" and the specification cites "luminance standard deviation < 80" and their respective inconsistent outcomes – suggest changing either the drawing or specification to be consistent with each other.

(v) FIG. 1 is inconsistent with the specification for reference character S107 when citing "AVERAGE VALUE < 132" and the specification cites "luminance average value > 132" and their respective inconsistent outcomes – suggest changing either the drawing or specification to be consistent with each other.

(vi) FIG. 1 contains misspellings of the word "EXPOSURE" underneath reference characters S108 through S115.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities:

(i) page 5, line 12 contains a grammatical error – suggest changing to "Further, in the...". Appropriate correction is required.

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. **Claim 1** is rejected under 35 U.S.C. 102(b) as being anticipated by Tsuchiya et al. (JP 2000-134467). A machine English translation of Tsuchiya has been provided.

Regarding **claim 1**, Tsuchiya discloses an image processing method of making luminance correction on the basis of a luminance histogram showing distribution of a luminance level of image data ("Exposure judging processing of an image and exposure amendment processing according to a judgment result are performed using the brightness histogram for which it asked above.", paragraph [0039] in combination with the method given in drawing 9), comprising the steps of:

obtaining a luminance average value in the luminance histogram ("First, by S4, the average I1 is calculated based on P1 and P2, and the average Imax is calculated based on Pmax-1 and Pmax.", paragraph [0066] wherein the variables are shown in the luminance histogram drawing 4 and the luminance average value in the luminance histogram is I1) and a peak distance showing a distance between peaks in the luminance histogram (Drawing 4 shows two peaks and a peak distance between peaks in the luminance histogram);

comparing a distribution discrimination value which can discriminate whether a distribution deviation of the luminance level exists on a low luminance side or a high luminance side in the luminance histogram or not with the distance between the peaks, thereby discriminating whether the image data is data of a backlight image or not on the basis of a result of the comparison ("Then, the overexposure of an input image judgment and judges [S6] an exposure undershirt by S7 continuously.", paragraph [0065] wherein exposure undershirt has been interpreted as underexposure. "Exposure judging processing of this operation gestalt can classify an input image into the exposure S11 of others, such as overexposure S8, the exposure undershirt S10, standard exposure S9, and a backlight.", paragraph [0054]. As shown in drawing

9, the value 190 is the distribution discrimination value at element S6 which discriminates whether a distribution deviation of the luminance levels exists on a low luminance side (step S10) or a high luminance side (step S8) when the value 190 is compared to the average Imax value. The distribution discrimination value also discriminates whether said image data is data of a backlight image or not on the basis of a result of said comparison, by discriminating that it automatically does not consider being a backlight image (because of the fact the only determination of a possible backlight image is given in step S43 when the number of peak areas of the luminance histogram is greater than 1).); and

comparing said luminance average value with an exposing state discrimination value which can discriminate the exposing state, thereby discriminating whether the image data is data of an image other than the backlight image or not ("Judge with the image judged by the image which was not judged by S7 to be an exposure undershirt and S13 to be standard exposure being standard exposure with a standard exposure book operation gestalt (S9).", paragraph [0073]. "Exposure judging processing of this operation gestalt can classify an input image into the exposure S11 of others, such as overexposure S8, the exposure undershirt S10, standard exposure S9, and a backlight.", paragraph [0054]. The luminance average I1 is compared to the exposing state discrimination value 50 or 150 which can discriminate the exposing state by determining whether the luminance histogram correlates to a standard exposure (step S9) or other exposure state including backlight possibility (step 11).).

7. **Claims 2** and **11** are rejected under 35 U.S.C. 102(e) as being anticipated by Matsushima (US 2003/0099407 A1).

Regarding **claim 2**, Matsushima discloses an image processing method of making luminance correction on the basis of a luminance histogram showing distribution of a luminance level of image data in which an image is expressed by a numerical value ("The present invention generally relates to image correction processes, and more particularly to a contrast correction process and a gradation correction process of a digital image.", paragraph [0002]), comprising the steps of:

obtaining a luminance average value in said luminance histogram, a luminance standard deviation indicative of a degree of dispersion of luminance distribution from the luminance average value ("It should be noted that N is a total number of pixels, Y(j) is a luminance of the "j"th pixel, and the sum .SIGMA. is obtained from j=1 through N. In addition, ave(Y(j)) is an average value of Y(j), and S(Y(j)) is a standard deviation of Y(j).", paragraph [0084] when defining the degree of distortion function Z in equation 3 to be later used in the algorithm at step S52, FIG. 7), and a peak distance showing a distance between peaks in the luminance histogram (FIG. 11 is an image showing a distance between peaks in a luminance histogram);

comparing a distribution discrimination value which can discriminate whether a distribution deviation of the luminance level exists on a low luminance side or a high luminance side in the luminance histogram or not with the obtained peak distance ("When Z>0, the luminance histogram is in a shape having the peak at a low luminance level as shown in FIG. 12. Accordingly, the type determination part 25 of the determination part 2 determines whether or not the calculated degree of distortion is greater than 0 in step S52 in FIG. 7. When the condition Z>0 is satisfied, the type of the input image is determined as the type A in step S56 in FIG. 7.

Further, the input image may be determined as the type A when a threshold value other than 0 is set and the degree of distortion Z is greater than the threshold value.", paragraph [0085] wherein the distribution discrimination value is the value 0. When comparing to the Z function, it can be determined if the distribution deviation of the luminance level exists on a low luminance side or a high luminance side in the luminance histogram.), comparing a halftone presence/absence discrimination value which can discriminate whether the distribution deviation of the luminance levels does not exist in a halftone in said luminance histogram or not with the obtained standard deviation, thereby discriminating whether the image is a backlight image or not on the basis of results of the comparisons ("First, a description will be given of the measuring part 21. As described above, in many cases, the histogram of the image determined as the type A has unbalanced distribution. Especially, in an image photographed against light, it is often the case that an object is extremely dark and the background is extremely bright. In such a case, the luminance histogram is polarized as shown in FIG. 8. The measuring part 21 measures the polarization level of the luminance histogram using the frequency and slope of the luminance histogram. FIG. 9 shows the process flow of the measuring part 21.", paragraph [0074] wherein type A is defined as "An image photographed against light, a portrait image photographed at night and the like are determined as the type A, for example.", paragraph [0072] which is a backlight image. Backlight images (type A) according to the disclosed invention are considered polarized which can be measured by the algorithm given in FIG. 9.

"A description will be given of a process in a case where the luminance histogram has two poles, by referring to FIG. 11. Also in this case, the same process is performed as that of the case shown in FIG. 10 until the level X is detected. However, in the case where the luminance

histogram has two poles, the slope h(i) sharply increases in a negative direction in an area where the frequency f(i) is less than the threshold value Th1. When h(i)=Th2 (Th2 is a threshold value)(Yes in step S23 in FIG. 9), the i is detected as a luminance level Y2 in step S35, and the process ends.", paragraph [0080] showing that the halftone presence discrimination value is Th1. A comparison with Th1 can show that an image is polarized, and if so, has at least two separate and distinct peaks with a distance between them from the luminance histogram.); and

comparing each of the luminance average value and the luminance standard deviation by using an exposing state discrimination value which can discriminate the exposing state, thereby discriminating an exposing state of an image other than the backlight image (The exposing state discrimination value is the same as the distribution discrimination value as above. The exposing state of the luminance histogram is also discriminated when determining the degree of distortion Z to value 0.

Regarding **claim 11**, Matsushima discloses the image processing method according to claim 2, wherein if it is determined that the image data is a part of a series of image data constructed by a plurality of data, the image process is executed to the image data obtained by collecting a series of image data (The image data is always part of a series of image data constructed by a plurality of data since if the image is more than one pixel, the series of image data constructed by a plurality of data is the array of pixels itself in the image. Since this is true in every case (unless the image is only one pixel), the image processing method as disclosed by Matsushima is executed to the image data (the array of pixels) by collecting a series of image data (any data produced from the image processing method.).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between Matsushima (US 2003/0099407 A1) and Tsuchiya et al. (JP 2000-134467).

Regarding **claim 3**, while Matsushima discloses the image processing method according to claim 2, Matsushima does not teach wherein the image process, luminance correction according to backlight process to the backlight image, an under-exposure process to an under-exposure image, an over-exposure process to an over-exposure image, and a standard exposure process to a standard exposure image is made in accordance with the exposing state of the image.

Tsuchiya discloses an image process method ("Exposure judging processing of an image and exposure amendment processing according to a judgment result are performed using the brightness histogram for which it asked above.", paragraph [0039] in combination with the method given in drawing 9) that teaches wherein the image process, luminance correction according to backlight process to the backlight image, an under-exposure process to an under-exposure image, an over-exposure process to an over-exposure image, and a standard exposure process is made in accordance with the exposing state of the image (Refer to references cited in

claim 1 wherein the exposing state value is I1. Drawing 9 discloses using the exposing state (average value of the histogram I1) to lead to four possibilities in determining the exposing state. "Exposure judging processing of this operation gestalt can classify an input image into the exposure S11 of others, such as overexposure S8, the exposure undershirt S10, standard exposure S9, and a backlight.", paragraph [0054].).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the method of Matsushima to perform wherein an image process, luminance correction according to backlight process to the backlight image, an under-exposure process to an under-exposure image, an over-exposure process to an over-exposure image, and a standard exposure process is made in accordance with the exposing state of the image of Tsuchiya as suggested by Tsuchiya "...to perform a suitable image processing according to an exposure.", Tsuchiya , paragraph [0015].

10. **Claims 4, 9,** and **10** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between Matsushima (US 2003/0099407 A1) and Maruoka et al. (US 2003/0002736 A1).

Regarding **claim 4**, while Matsushima discloses the image processing method according to claim 2, Matsushima does not teach wherein in the under-exposure process, in a histogram of the under-exposure image, the histogram is stretched in accordance with the histogram of the under-exposure image so as to shift the luminance average value existing on the low luminance side toward a predetermined value of the histogram.

Maruoka teaches an automatic tone correction apparatus ("...an improved digital image processing apparatus that can correct an input image, more specifically, that can automatically correct tones of an input image.", paragraph [0001]) wherein in an under-exposure process, in a histogram of an under-exposure image, the histogram is stretched in accordance with the histogram of the under-exposure image so as to shift the luminance average value existing on the low luminance side toward a predetermined value of the histogram (An example of this histogram is shown in FIG. 40(a). Next, assuming that the minimum density value of the created density histogram is dmin, the maximum density value is dmax, the number of pixels having a pixel density d is F1[d], and the number of pixels after conversion is F2[d], a histogram which is corrected so as to expand a pixel density distribution area over the whole pixel luminance (refer to FIG. 40(b)) is formed according to formula (1) as follows and, simultaneously, a point (center of gravity) G which divides the area of the histogram into two equal parts is calculated.", paragraph [0004] wherein FIG. 40(a) and FIG. 40(b) show the disclosed algorithm stretching the luminance histogram of an under-exposure image and the predetermined value is the target value. Since the histogram as a whole is shifted toward the target value, the luminance average (center of gravity) will naturally shift in that same direction. The target value is given in equation (7), page 11.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of Matsushima to disclose wherein in an under-exposure process, in a histogram of an under-exposure image, the histogram is stretched in accordance with the histogram of the under-exposure image so as to shift the luminance average

value existing on the low luminance side toward a predetermined value of the histogram as taught by Maruoka "...that optimizes the shape of the histogram.", Maruoka , paragraph [0002].

Regarding **claim 9**, while the combination between Matsushima and Maruoka discloses the image processing method according to claim 4, the combination does not teach wherein said predetermined value is an intermediate value in the histogram.

Maruoka teaches an automatic tone correction apparatus ("...an improved digital image processing apparatus that can correct an input image, more specifically, that can automatically correct tones of an input image.", paragraph [0001]) wherein a predetermined value is an intermediate value in the histogram (As cited in claim 4, FIG. 40(a) and FIG. 40(b) show the disclosed algorithm stretching the luminance histogram of an under-exposure image and the predetermined value is the target value. The predetermined value (target value) is calculated from equation (7) as cited in claim 6. According to the equation, the target value must lie somewhere within the values 0 and 255 of the histogram – thus making it an intermediate value in the histogram with respective to the x-axis.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of the combination between Matsushima and Maruoka to disclose wherein the predetermined value is an intermediate value in the histogram as taught by Maruoka for setting a "...value to which the center of gravity of the low-luminance part of the luminance histogram should be shifted...", Maruoka, paragraph [0018].

Regarding **claim 10**, while Matsushima discloses the image processing method according to claim 2, the combination does not teach wherein prior to discriminating said exposing state, whether said image data is artificially formed image data or not is discriminated, and if it is determined that said image data is the artificially formed image data, the luminance correction is not made to said image data.

Maruoka teaches an automatic tone correction apparatus ("In this first embodiment, the whole luminance distribution of a luminance histogram is expanded over all tones to improve the contrast of an input image as a whole, and simultaneously, the luminance histogram is corrected so that the center of gravity of a low-luminance part of the histogram is shifted to a target value.", paragraph [0124]) wherein prior to discriminating an exposing state, whether the image data is artificially formed image data or not is discriminated, and if it is determined that the image data is the artificially formed image data, the luminance correction is not made to the image data ("Further, when the luminance distribution formed by the luminance distribution formation circuit 104 is discrete, tone correction is not carried out (corresponding to claim 24). An example of luminance distribution in this case is shown in FIG. 9. When the luminance distribution is discrete, the input image can be judged as an artificial image, not a natural image. When an artificial image is inputted, it is better not to perform tone correction.", paragraph [0173]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of Matsushima to disclose wherein prior to discriminating an exposing state, whether the image data is artificially formed image data or not is discriminated, and if it is determined that the image data is the artificially formed image data,

the luminance correction is not made to the image data as taught by Maruoka since "...the luminance distribution is discrete...", Maruoka, paragraph [0173].

11. **Claims 5, 6, 7, 8, 15, 16,** and **17** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between Matsushima (US 2003/0099407 A1) and Tsuchiya et al. (JP 2000-134467), in further view of Maruoka et al. (US 2003/0002736 A1).

Regarding **claim 5**, while the combination between Matsushima and Tsuchiya disclose the image processing method according to claim 3, the combination does not teach wherein in the over-exposure process, in a histogram of the over-exposure image, the histogram is stretched in accordance with the histogram of the over-exposure image so as to shift the luminance average value existing on the high luminance side toward a predetermined value of the histogram.

Maruoka teaches an automatic tone correction apparatus ("In this fifth embodiment, the target value is corrected.", paragraph [0313]) wherein in an over-exposure process, in a histogram of the over-exposure image, the histogram is stretched in accordance with the histogram of the over-exposure image so as to shift the luminance average value existing on the high luminance side toward a predetermined value of the histogram ("With reference to FIG. 38(a), since the peak position of the target luminance distribution exists on the lower-luminance side than the peak position of the distribution of the luminance histogram, the target value is on the lower-luminance side than the center of gravity. Accordingly, in FIG. 38(b), the luminance histogram is corrected so that the center of gravity matches the target value that is smaller than

the center of gravity, whereby the contrast is improved, but the image is darkly corrected. However, in FIG. 38(c), since the target value is corrected to the center of gravity, the contrast is improved while maintaining the original brightness.", paragraph [0325] wherein the predetermined value is the target value. Since the histogram as a whole is shifted toward the target value, the luminance average (center of gravity) will naturally shift in that same direction. The target value is given in equation (7), page 11.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of the combination between Matsushima and Tsuchiya to disclose wherein in an over-exposure process, in a histogram of the over-exposure image, the histogram is stretched in accordance with the histogram of the over-exposure image so as to shift the luminance average value existing on the high luminance side toward a predetermined value of the histogram as taught by Maruoka "...that optimizes the shape of the histogram.", Maruoka , paragraph [0002].

Regarding **claim 6**, while the combination between Matsushima and Tsuchiya disclose the image processing method according to claim 3, the combination does not teach wherein in the standard exposure process, in a histogram of the standard exposure image, the luminance average value is shifted toward a predetermined value in accordance with the histogram.

Maruoka teaches an automatic tone correction apparatus ("In this first embodiment, the whole luminance distribution of a luminance histogram is expanded over all tones to improve the contrast of an input image as a whole, and simultaneously, the luminance histogram is corrected so that the center of gravity of a low-luminance part of the histogram is shifted to a target

value.", paragraph [0124]) wherein in the standard exposure process, in a histogram of the standard exposure image, the luminance average value is shifted toward a predetermined value in accordance with the histogram ("In this case, since tone correction is carried out so that the center of gravity of the low-luminance part of the luminance distribution which is corrected by formula (5) matches the target value, when the center of gravity calculated by the center-of-gravity calculation circuit 105 is indicated by G and the target value stored in the target value storage circuit 107 is indicated by g, a .gamma. value that satisfies the following formula (7) should be calculated. 4 g = 255 .times. ((G - Y min) / (Y max - Y min)) 1 (7)", paragraph [0142] wherein the luminance average value (center of gravity) is shifted toward a predetermined value g (target value).).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of the combination between Matsushima and Tsuchiya to disclose wherein in an over-exposure process, in a histogram of the over-exposure image, the histogram is stretched in accordance with the histogram of the over-exposure image so as to shift the luminance average value existing on the high luminance side toward a predetermined value of the histogram as taught by Maruoka "...that optimizes the shape of the histogram.", Maruoka , paragraph [0002].

Regarding **claim 7**, while the combination between Matsushima and Tsuchiya disclose the image processing method according to claim 3, the combination does not teach wherein in the backlight process, a histogram of the backlight image is divided into halves, the histogram on the low luminance side is stretched in accordance with the histogram of the backlight image so as

to shift the luminance average value existing on the low luminance side toward a predetermined value, and the histogram on the high luminance side is stretched in accordance with the histogram of the backlight image so as to shift the luminance average value existing on the high luminance side toward the predetermined value.

Maruoka teaches an automatic tone correction apparatus ("In this fourth embodiment, a boundary of a low-luminance part and a high-luminance part is detected on the basis of the shape of a luminance histogram.", paragraph [0272]) wherein in a backlight process, a histogram of the backlight image is divided into halves, the histogram on a low luminance side is stretched in accordance with the histogram of the backlight image so as to shift the luminance average value existing on the low luminance side toward a predetermined value, and the histogram on the high luminance side is stretched in accordance with the histogram of the backlight image so as to shift the luminance average value existing on the high luminance side toward a predetermined value ("FIG. 30(a) is a luminance histogram of an image in the back-lighted state. In this state, two peaks of mountain-shape distributions are generated on the low-luminance side and the high-luminance side, and the range A of the peak (mountain-shape distribution) on the low-luminance side and the range B of the peak on the high-luminance side are detected, and the boundary value is positioned at the "valley" of the two mountain-shape distributions.", paragraph [0280] in combination with "FIGS. 31(a)-31(c) illustrate the correction process for the back-lighted image shown in FIG. 30(a), and FIGS. 32(a)-32(c) illustrate the correction process for the forward-lighted image shown in FIG. 30(b). More specifically, FIGS. 31(a) and 32(a) illustrate the target value calculating process by the target value calculation circuit 1508, FIGS. 31(b) and 32(b) illustrate the center-of-gravity calculating process by the center-of-gravity calculation circuit

1506, and FIGS. 31(c) and 32(c) illustrate the correcting process by the image signal correction circuit 1510. It is assumed that a luminance distribution having a normal distribution shape is stored in the target luminance distribution storage circuit 1505.", paragraph [0284].).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of the combination between Matsushima and Tsuchiya to disclose wherein in the backlight process, a histogram of the backlight image is divided into halves, the histogram on said low luminance side is stretched in accordance with the histogram of the backlight image so as to shift the luminance average value existing on the low luminance side toward a predetermined value, and the histogram on the high luminance side is stretched in accordance with the histogram of the backlight image so as to shift the luminance average value existing on the high luminance side toward said predetermined value as taught by Maruoka "...that optimizes the shape of the histogram.", Maruoka , paragraph [0002].

Regarding **claim 8**, while the combination between Matsushima, Tsuchiya, and Maruoka disclose the image processing method according to claim 6, the combination does not disclose wherein in the backlight process, contacts where the histogram on the low luminance side and the histogram on the high luminance side have been respectively stretched are smoothly shown by using a three-dimensional function.

Tsuchiya discloses an image process method ("Exposure judging processing of an image and exposure amendment processing according to a judgment result are performed using the brightness histogram for which it asked above.", paragraph [0039] in combination with the method given in drawing 9) that teaches wherein in a backlight process, contacts where the

histogram on a low luminance side and the histogram on the high luminance a have been respectively stretched are smoothly shown by using a three-dimensional function ("Moreover, although the gradation curve of two break points was used with the 1st operation gestalt like LUT shown in drawing 7 as a gradation curve, it is possible to mitigate computational complexity by using the gradation curve of one break point still like LUT of drawing 6 in simple. Or when a smooth change of halftone is required, it is possible to be with approximation curves, such as a SHUPU line curve, and to connect a gradation curve smoothly.", paragraph [0108] where SHUPU line curve has been assumed to be the machine-translation of a "spline curve" as supported in the US patent application Yamazoe et al. US 6,694,051 B1 from which has claimed foreign priority to Tsuchiya as follows: "Though a gradation curve which has two folded points like an LUT shown in FIG. 15 is used in the fifth embodiment, a gradation curve which has one folded point like an LUT shown in FIG. 14 may conveniently used to reduce a calculation amount. When a smooth variation having an intermediate tone is required, it is possible to connect gradation curves smoothly using an approximate curve such as a spline curve.", column 20, line 36. It is well known to one of ordinary skill in the art that a common spline curve is a natural cubic spline.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of the combination between Matsushima, Tsuchiya and Maruoka to disclose wherein in a backlight process, contacts where the histogram on a low luminance side and the histogram on a high luminance side have been respectively stretched are smoothly shown by using a three-dimensional function as taught by Tsuchiya to work and compute with less sample points in the histogram for better computation time.

Regarding **claim 15**, while the combination between Matsushima, Tsuchiya, and Maruoka disclose the image processing method according to claim 5, the combination does not teach wherein the predetermined value is an intermediate value in the histogram.

Maruoka teaches an automatic tone correction apparatus ("...an improved digital image processing apparatus that can correct an input image, more specifically, that can automatically correct tones of an input image.", paragraph [0001]) wherein a predetermined value is an intermediate value in the histogram (The predetermined value is the same calculated target value as cited in claim 9. Refer to references cited in claim 9.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of the combination between Matsushima, Tsuchiya, and Maruoka to disclose wherein the predetermined value is an intermediate value in the histogram as taught by Maruoka for setting a "...value to which the center of gravity of the low-luminance part of the luminance histogram should be shifted...", paragraph [0018].

Regarding **claim 16**, while the combination between Matsushima, Tsuchiya, and Maruoka disclose the image processing method according to claim 6, the combination does not teach wherein the predetermined value is an intermediate value in the histogram.

Maruoka teaches an automatic tone correction apparatus ("...an improved digital image processing apparatus that can correct an input image, more specifically, that can automatically correct tones of an input image.", paragraph [0001]) wherein a predetermined value is an

intermediate value in the histogram (The predetermined value is the same calculated target value as cited in claim 9. Refer to references cited in claim 9.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of the combination between Matsushima, Tsuchiya, and Maruoka to disclose wherein the predetermined value is an intermediate value in the histogram as taught by Maruoka for setting a "...value to which the center of gravity of the low-luminance part of the luminance histogram should be shifted...", paragraph [0018].

Regarding **claim 17**, while the combination between Matsushima, Tsuchiya, and Maruoka disclose the image processing method according to claim 7, the combination does not teach wherein the predetermined value is an intermediate value in the histogram.

Maruoka teaches an automatic tone correction apparatus ("...an improved digital image processing apparatus that can correct an input image, more specifically, that can automatically correct tones of an input image.", paragraph [0001]) wherein a predetermined value is an intermediate value in the histogram (The predetermined value is the same calculated target value as cited in claim 9. Refer to references cited in claim 9.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing method of the combination between Matsushima, Tsuchiya, and Maruoka to disclose wherein the predetermined value is an intermediate value in the histogram as taught by Maruoka for setting a "...value to which the center of gravity of the low-luminance part of the luminance histogram should be shifted...", paragraph [0018].

12. **Claims 12** and **14** are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between Matsushima (US 2003/0099407 A1) and Lee et al. (US 5,012,333 A).

Regarding **claim 12**, while Matsushima discloses an image processing apparatus for making luminance correction on the basis of a luminance histogram showing distribution of a luminance level of image data in which an image is expressed by a numerical value ("The present invention generally relates to image correction processes, and more particularly to a contrast correction process and a gradation correction process of a digital image.", paragraph [0002]), comprising:

a luminance average value obtaining unit which obtains a luminance average value in the luminance histogram; a luminance standard deviation obtaining unit which obtains a luminance standard deviation indicative of a degree of dispersion of luminance distribution from the luminance average value in the luminance histogram ("It should be noted that N is a total number of pixels, Y(j) is a luminance of the "j"th pixel, and the sum .SIGMA. is obtained from j=1 through N. In addition, ave(Y(j)) is an average value of Y(j), and S(Y(j)) is a standard deviation of Y(j).", paragraph [0084] when defining the degree of distortion function Z in equation 3 to be later used in the algorithm at step S52, FIG. 7. The obtaining unit itself would be the computer algorithm implemented to perform the Z function calculation: "Accordingly, a general object of the present invention is to provide an improved and useful image processing apparatus, image processing method, computer program, and a computer-readable storage medium in which the above-mentioned problems are eliminated.", paragraph [0018].);

an exposure discriminating unit which compares a distribution discrimination value which can discriminate whether a distribution deviation of the luminance level exists on a low luminance side or a high luminance side in the luminance histogram or not with the obtained peak distance (Refer to references cited in claim 2 wherein the exposure discriminating unit is the calculation part 22 of FIG. 6 inside the determination part 2 of FIG. 1 in calculating the degree of distortion Z that compares to value 0.), compares a halftone presence/absence discrimination value which can discriminate whether the distribution deviation of the luminance levels does not exist in a halftone in the luminance histogram or not with the obtained standard deviation (refer to references cited in claim 2), discriminates whether the image is a backlight image or not on the basis of results of the comparisons (refer to references cited in claim 2), and compares each of the luminance average value and the luminance standard deviation by using an exposing state discrimination value which can discriminate the exposing state, thereby discriminating an exposing state of an image other than the backlight image (refer to references cited in claim 2); and

a correction processing unit which makes the luminance correction on the basis of a result of the discrimination of the exposure discriminating unit ("Next, a description will be given of the processing part 5 that performs step S4 in FIG. 2. The processing part 5 performs the contrast correction on an entire image, by using the dynamic range set by the dynamic range setting part 4. In other words, when a luminance value of the "j"th pixel (j=1, 2, . . . N-1, N) is Yin(j), a luminance value Y1(j) after the contrast correction is calculated by equation (6), and a correction coefficient C0(j) is calculated by equation (7) as follows.", paragraph [0111].), Matsushima does

not disclose a peak distance obtaining unit which obtains a distance between peaks of luminance level distribution in the luminance histogram.

Lee discloses an interactive dynamic range adjustment system for printing digital images ("A basic system of an interactive image processor on which the present invention is implemented is illustrated in FIG. 2", column 2, line 15) wherein the system teaches a peak distance obtaining unit which obtains a distance between peaks of luminance level distribution in the luminance histogram ("The histogram canvas 45 displays the density histogram of the input image.", column 9, line 35 as shown in FIG. 5. It is well known to one of ordinary skill in the art that luminance is a photometric measure of the density of luminous intensity in a given direction, hence a density histogram is directly related to a luminance histogram. As shown in FIG. 5, the density histogram is displayed on screen 50 showing peak distance being obtained when viewed by the user. The obtaining of the distance between peaks of the density histogram occurs when either the user views the histogram, or compares it to the notches on the horizontal axis. Since luminance is a direct measure of the density of luminous intensity, a difference in peaks as seen from the viewed density histogram is also a viewing of a difference in peaks of a luminance histogram.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing apparatus of Matsushima to disclose a peak distance obtaining unit which obtains a distance between peaks of luminance level distribution in the luminance histogram as taught by Lee that "...allows the user to display the locations of the pixels which have density values within a specified range.", column 10, line 61.

Regarding **claim 14**, Matsushima discloses the image processing apparatus according to claim 12, further comprising a same image discriminating unit which discriminates whether the image data is a series of image data constructed by a plurality of data or not, and wherein if the same image discriminating unit determines that the image data is same banded image data, the image process is executed to the image data obtained by collecting a series of image data (The image data is always part of a series of image data constructed by a plurality of data since if the image is more than one pixel, the series of image data constructed by a plurality of data is the array of pixels itself in the image. Since this is true in every case (unless the image is only one pixel), the image processing method as disclosed by Matsushima is executed to the image data (the array of pixels) by collecting a series of image data (any data produced from the image processing method.).

13. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination between Matsushima (US 2003/0099407 A1) and Lee et al. (US 5012333 A), in further view of and Maruoka et al. (US 2003/0002736 A1).

Regarding **claim 13**, while the combination between Matsushima and Lee discloses the image processing apparatus according to claim 12, the combination does not teach further comprising an artificial image discriminating unit which discriminates whether the image data is artificially formed image data or not prior to the discrimination of a exposure discriminating unit, and wherein when it is determined by the artificial image discriminating unit that the image data

is the artificially formed image data, the correction processing unit does not make the luminance correction to the image data.

Maruoka teaches an automatic tone correction apparatus ("In this first embodiment, the whole luminance distribution of a luminance histogram is expanded over all tones to improve the contrast of an input image as a whole, and simultaneously, the luminance histogram is corrected so that the center of gravity of a low-luminance part of the histogram is shifted to a target value.", paragraph [0124]) further comprising an artificial image discriminating unit which discriminates whether the image data is artificially formed image data or not prior to the discrimination of a exposure discriminating unit, and wherein when it is determined by the artificial image discriminating unit that the image data is the artificially formed image data, the correction processing unit does not make the luminance correction to the image data ("Further, when the luminance distribution formed by the luminance distribution formation circuit 104 is discrete, tone correction is not carried out (corresponding to claim 24). An example of luminance distribution in this case is shown in FIG. 9. When the luminance distribution is discrete, the input image can be judged as an artificial image, not a natural image. When an artificial image is inputted, it is better not to perform tone correction.", paragraph [0173]).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the image processing apparatus of the combination between Matsushima and Lee to disclose further comprising an artificial image discriminating unit which discriminates whether the image data is artificially formed image data or not prior to the discrimination of a exposure discriminating unit, and wherein when it is determined by the artificial image discriminating unit that the image data is the artificially formed image data, the correction

processing unit does not make the luminance correction to the image data as taught by Maruoka since "...the luminance distribution is discrete...", paragraph [0173].

Conclusion

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David P. Rashid whose telephone number is (571) 270-1578. The examiner can normally be reached on 7:30 - 17:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Werner can be reached on (571) 272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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